IN THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently amended) A video encoder comprising:

     a motion estimator to perform a motion search on input video data relative to a reference video frame to generate a plurality of motion vectors, the motion search comprises a rectangular motion search including

        a motion measurement on a plurality of motion search points that form a rectangular search region, each of the plurality of motion search points corresponding to a pixel block, wherein a minimal motion search point among the plurality of motion search points is found based on result of the motion measurement, and

        a refinement motion search on a sub-pixel level if the minimal motion search point is within an inner region of the rectangular search region; and

     a variable length coder to compress the input video data using the motion vectors.

2.   (Original) The video encoder of claim 1, further comprising:

     a transformer to transform the input video data in real-domain; and

     a quantization unit to quantize the transformed video data.

3.   (Original) The video encoder of claim 1, further comprising a frame memory, coupled to the motion estimator, to store the reference frame.

4.   (Currently amended) A method comprising:

performing a motion search on input video data relative to a reference video frame to generate a plurality of motion vectors, the motion search comprises a rectangular motion search, wherein performing the motion search comprises

performing a motion measurement on a plurality of motion search points that form a rectangular search region, each of the plurality of motion search points corresponding to a pixel block, [[and]]

finding a minimal motion search point among the plurality of motion search points based on result of the motion measurement, and

performing a refinement motion search on a sub-pixel level if the minimal motion search point is within an inner region of the rectangular search region; and

compressing the input video data using the motion vectors.

5.   (Original) The method of claim 4, further comprising:

transforming the input video data in real-domain; and

quantizing the transformed video data.

6.   (Original) The method of claim 4, further comprising storing the reference frame.

7.   (Currently amended) A method to determine relative movement of a pixel block from a first video frame to a second video frame, the method comprising:

performing a motion measurement on a plurality of motion search points that form a

rectangular search region, each of the plurality of motion search points corresponding to a pixel

block;

finding a minimal motion search point among the plurality of motion search points based

on result of the motion measurement;

performing a refinement motion search on a sub-pixel level if the minimal motion search

point is within an inner region of the rectangular search region; and

finding a motion vector corresponding to the relative movement of the pixel block from

the first video frame to the second video frame ~~if the minimal motion search point is within an~~

~~inner region of the rectangular search region~~.

8.   (Currently amended) The method of claim 7, further comprising:

repositioning the rectangular search region to be substantially centered on the minimal

motion search point and partially overlapping a previous position of the rectangular search

region while maintaining a size of the rectangular search region to be substantially the same if

the minimal motion search point is along an edge or at a corner of the rectangular search region,

the repositioned rectangular search region including a second plurality of motion search points;

and

performing a motion measurement on the second plurality of motion search points.

9.   (Original) The method of claim 8, wherein the motion measurement on the second

plurality of motion search points excludes the one or more of the plurality of motion search

points falling within both the rectangular search region and the repositioned rectangular search

region.

10.   (Original) The method of claim 7, further comprising:

dividing the rectangular search region into a plurality of data units, each of the plurality

of data units having substantially the same size and a distinct subset of the plurality of motion

search points, wherein the motion measurement is performed in each of the plurality of data units

one by one.

11.   (Original) The method of claim 10, wherein the rectangular search region is a square

search region having 16 motion search points.

12.   (Original) The method of claim 11, wherein the square search region is divided into 4

data units, each of the 4 data units has 4 distinct motion search points.

13.   (Currently amended) The method of claim 7, ~~further comprising performing a refinement~~

~~motion search,~~ wherein performing the refinement motion search comprises shrinking the

rectangular search region at the minimal point if the minimal motion search point is within the

inner region of the rectangular search region.

14.   (Original) The method of claim 7, further comprising performing a sub-pixel motion

search around the minimal point if the minimal motion search point is within an inner region of

the rectangular search region.

15.   (Currently amended) A method to compress video data comprising:

defining a first video frame as a reference video frame;

performing a motion search on a second video frame relative to the reference video frame to determine a plurality of motion vectors of the second video frame relative to the reference video frame; and

reducing the video data to the reference video frame and the plurality of motion vectors of the second video frame, wherein the motion search includes

performing motion measurement on a plurality of motion search points that form a rectangular search region ~~within a pixel block~~, each of the plurality of motion search points corresponding to a pixel block;

finding a minimal motion search point among the plurality of motion search points based on result of the motion measurement; [[and]]

performing a refinement motion search on a sub-pixel level if the minimal motion search point is within an inner region of the rectangular search region; and

finding a motion vector corresponding to the relative movement of the pixel block from the first video frame to the second video frame ~~if the minimal motion search point is within an inner region of the rectangular search region~~.

16.   (Currently amended) The method of claim 15, wherein performing the motion search further comprises:

repositioning the rectangular search region to be substantially centered on the minimal motion search point and partially overlapping a previous position of the rectangular search region while maintaining a size of the rectangular search region to be substantially the same if the minimal motion search point is along an edge or at a corner of the rectangular search region, the repositioned rectangular search region including a second plurality of motion search points; and

performing a motion measurement on the second plurality of motion search points.

17.   (Original) The method of claim 16, wherein the motion measurement on the second plurality of motion search points excludes the one or more of the plurality of motion search points falling within both the rectangular search region and the repositioned rectangular search region.

18.   (Original) The method of claim 15, wherein performing the motion search further comprises:

dividing the rectangular search region into a plurality of data units, each of the plurality of data units having substantially the same size and a distinct subset of the plurality of motion search points, wherein the motion measurement is performed in each of the plurality of data units one by one.

19.   (Currently amended) A computer-readable medium encoded with a computer program having computer executable instructions for causing a processor that, if executed by a processor, will cause the processor to perform operations to determine relative movement of a pixel block from a first video frame to a second video frame, the operations comprising:

performing a motion measurement on a plurality of motion search points that forms a rectangular search region within the pixel block, each of the plurality of motion search points corresponding to a pixel block;

finding a minimal motion search point among the plurality of motion search points based on result of the motion measurement;

performing a refinement motion search on a sub-pixel level if the minimal motion search point is within an inner region of the rectangular search region; and

finding a motion vector corresponding to the relative movement of the pixel block from the first video frame to the second video frame ~~if the minimal motion search point is within an inner region of the rectangular search region~~.

20.   (Currently amended) The computer-readable medium of claim 19, wherein the operations further comprise:

repositioning the rectangular search region to be substantially centered on the minimal motion search point and partially overlapping a previous position of the rectangular search region while maintaining a size of the rectangular search region to be substantially the same if the minimal motion search point is along an edge or at a corner of the rectangular search region, the repositioned rectangular search region including a second plurality of motion search points; and

performing a motion measurement on the second plurality of motion search points.

21.   (Previously Presented) The computer-readable medium of claim 20, wherein the motion measurement on the second plurality of motion search points excludes the one or more of the plurality of motion search points falling within both the rectangular search region and the repositioned rectangular search region.

22.   (Previously Presented) The computer-readable medium of claim 19, wherein the operations further comprise:

dividing the rectangular search region into a plurality of data units, each of the plurality

of data units having substantially the same size and a distinct subset of the plurality of motion

search points, wherein the motion measurement is performed in each of the plurality of data units

one by one.

23.   (Previously Presented) The computer-readable medium of claim 22, wherein the

rectangular search region is a square search region having 16 motion search points.

24.   (Previously Presented) The computer-readable medium of claim 23, wherein the square

search region is divided into 4 data units, each of the 4 data units has 4 distinct motion search

points.

25.   (Currently amended) A system comprising:

a dynamic random access memory (DRAM) device;

a memory controller coupled to the DRAM device; and

a parallel processor chip coupled to the memory controller, the parallel processor chip

comprising

a plurality of registers defining a register file; and

a parallel processor coupled to the plurality of registers, wherein the parallel

processor is operable to perform operations to determine relative movement of a pixel block

from a first video frame to a second video frame, the operations comprising:

performing a motion measurement on a plurality of motion search points

that form a rectangular search region ~~within the pixel block~~, each of the plurality of motion

search points corresponding to a pixel block;

finding a minimal motion search point among the plurality of motion

search points based on result of the motion measurement; [[and]]

performing a refinement motion search on a sub-pixel level if the minimal

motion search point is within an inner region of the rectangular search region; and

finding a motion vector corresponding to the relative movement of the

pixel block from the first video frame to the second video frame if the minimal motion search

point is within an inner region of the rectangular search region.

26.   (Currently amended) The system of claim 25, wherein the operations further comprise:

repositioning the rectangular search region to be substantially centered on the minimal

motion search point and partially overlapping a previous position of the rectangular search

region while maintaining a size of the rectangular search region to be substantially the same if

the minimal motion search point is along an edge or at a corner of the rectangular search region,

the repositioned rectangular search region including a second plurality of motion search points;

and

performing a motion measurement on the second plurality of motion search points.

27.   (Original) The system of claim 26, wherein the motion measurement on the second

plurality of motion search points excludes the one or more of the plurality of motion search

points falling within both the rectangular search region and the repositioned rectangular search

region.

28.   (Original) The system of claim 25, wherein the parallel processor loads a plurality of data elements into a rectangular region within the register file, the rectangular region corresponding to the rectangular search region.

29.   (Original) The system of claim 25, further comprising a microprocessor coupled to the memory controller.